

## TECHNICAL SPECIFICATION FOR LIFTS

**TECHNICAL SPECIFICATION FOR DESIGN, SUPPLY, ERECTION, TESTING AND COMMISSIONING OF ELECTRICALLY OPERATED PASSENGERS LIFT OF G+3 FLOOR, 13PERSONS (APPX. 884 KGS) CAPACITY, WITH MACHINE ROOM LESS WITH GEARLESS FOR ADMIN BUILDING (G+3) OF MEMU SHED NEAR MANJATTIDAL STATION AT TIRUCHIRAPPALLI - WORKS CONTRACT..**

### **I. SCOPE OF WORK:**

Design, supply, erection, testing and commissioning of passenger Lift of G + 3floors, 13 persons **Gearless with machine room less as per CPWD specification part III for lift 2003 and latest.** The general requirements of Lift are given below:

### **II. TECHNICAL REQUIREMENTS:** Detailed specification is given in Part II at Schedule 'A'.

### **III. GENERAL SPECIFICATIONS:** The machine roomless lifts are governed by European code of safety EN 81. The main traction machine, over speed governor, ropes, brake gear controls and other safety equipment even though corresponding to specification EN 81 should under all conditions of operations at least match with the IS code of specification for passenger lifts viz. IS: 1860, IS: 14665, IS:3554, IS:7759, IS:9803, IS: 10913, IS: 9878, IS: 10191. This has to be ensured by lift manufacture's primarily. The installation shall also comply with the provision of Indian electricity act and rules and shall be taken over only if and when they fully comply with all their requirements.

i. **Machine:** The machine shall be of single wrap traction type and should include a motor, electromechanical brake. The traction machine will be either induction machine or synchronous machine without gear. The driving sheave should be integrally coupled with the machine and the assembly to be completely mounted on guide rail or on suitable rigid frame fixed to the shaft. The driving sheave should be constructed from fabricated cast steel or S.G. iron or suitable wear resistant material with truly machined surface in order to ensure perfect alignment of all bearings and prevent transmission of sound to the building. The contractor shall furnish detailed drawings showing weights to be tackled and the disposition of various loads on the lift shaft and lift well for the approval of purchaser.

ii. **Electric Motor Duty Cycle :** The driving motor shall be designed especially for heavy lifts duly to run smoothly under load up to its maximum capacity in either direction with ample power to deal with occasional overloads, it shall be arranged to develop the requisite, torque, enabling the machine to start easily from rest.

The motor will be designed to confirm to S3 duty cycles defined as per IEC duty cycles for non peak and peak periods of operation. The motor and drive system should be designed for not less than 150 starts/hour and stops during the peak periods. The peak periods of lift working are generally between 8.30 – 10.30 hours in morning and 17.00 – 19.00 hours in evening.

iii **Brake :** A suitable electromagnetic brake, preferably of the direct acting type operating on AC/DC shall be provided to the coupling between the motor and worm shaft, with brake shoes which are automatically applied by means of a strong compression springs to the brake wheel of large diameter when the circuit is broken and released by means of an electric-magnet.

The brake mechanism must incorporate provision to allow for ware of brake lining. It shall also have an emergency quick release device to open the brake without affecting its adjustment so that the car can be lowered or raised manually in the event of electric supply failure. The electric solenoid shall be rated to withstand continuous lift duty.

- iv Car :** The car interiors enclosure shall be made of stainless steel “ISS 316” panels ASI-304 No.4 **anti-scratch finish as approved by Engineer in charge** with PVC anti skid flooring end. The lift car shall have adequately illuminated by indirect LED light of flush mounted pattern, one axial flow fan, one smoked mirror of half height full width on the rear panel. A suitable hand rail will be provided at appropriate height to facilitate use by handicapped passengers.
- A load label indicating load of the lift and No. of passenger carrying capacity shall be offered in the lift car in a conspicuous position.
- One lighting socket for hand lamp shall be provided on the top of the lift car for inspection.
- v Doors :** Landing doors and car door shall be of center opening sliding stainless steel doors. The clear opening should be 1100mm wide x 2000mm height. The doors should be driven by an independent power drive.
- The car doors will be fitted with 2D infrared curtain to detect and open the doors in the event of obstruction /infringement while the doors are closing.
- The landing doors shall be provided with electro-mechanical inter-locks to prevent operation of the lift unless all the doors are closed and positively locked. The inter-lock shall also prevent the opening of any door until the car has reached the respective landing zone. In the event of failure of infrared curtain suitable mechanical system should be provided to open the doors in the face of obstruction.
- vi Car slinging and safety gear :**
- The car body will be supported in a steel sling with suitable isolators so that no strains due to suspension occur and to prevent vibration and jerky motion. The sling will comprise of a cross head with a rope mechanism fixed on it. The sling will be provided with adjustable shoes on each side at the top and bottom to engage accurately with the guides to ensure smooth running.
- The car shall have underneath it an automatic instantaneous type safety gear (operated by a over speed governor) designed to ensure positive action for excessive speed on the down travel of the car. The safety gear shall be equipped with a contact to cut-off power supply in such an event and bring the car to a stop.
- vii Suspension Ropes :** The main suspension ropes shall be of the best flexible steel wire construction with a minimum factor of safety of 10 times. The supply of steel wire ropes will be from approved and reputed rope manufacturers only.
- viii Diverting Pulleys;** Diverting pulleys if necessary for suspension of car on counter weight shall be of cast iron, grooved for wire ropes complete with shaft, bearings and supported on RSJs or channels, if any required shall be provide by the contractor.
- ix Guides :** The guides for the car and counterweight shall be steel ‘T’ sections with machined working surfaces. These guides shall be erected to plumb and shall be complete with suitable fixings at such intervals as to prevent deflection. The sections of weight in Kgs per meter of the rails shall be furnished in Schedule “C1” Guide rails lubricators of approved design shall be provided.
- x Counter weight :** The counter weight shall consist of a structural steel frame with loose cast iron filler weights arranged to balance the full weight of the car plus, approximately 50% of the contract load so as to ensure low power consumption and economical running of the lift.

The guide shoes shall be fitted to the top and bottom of the structural frame on both sides and shall be adjustable type to ensure smooth and quiet running and long life. Counter weights shall be guarded in standard fashion by means of a rigid fixed screen extending from a position of 0.3 metres above the lift pit floor to a position at least two meters above the lift pit floor.

- xi Buffers :** Suitable spring buffers/Hydraulic buffers of tested design shall be installed under the lift car and counter weight.

**IV OPERATING SYSTEM:** The lift operation system shall be of simplex full collective type with provision for operation with or without attendant. It should comprise call button on each landing and a set of dispatch buttons together with an emergency stop button in the car. All components shall be well insulated and mounted in a metal case with suitably finished cover.

- a Controller :** The control system shall be of variable voltage, variable frequency with microprocessor based traffic master series simplex selective collective. The control system shall include PWM inverter of standard and latest design so as to achieve maximum energy savings and accurate control. The control system will limit the starting current of the motor to within 1.5 times the rated current under all conditions of operation.

The controller shall be entirely automatic in action and specially designed to operate in conjunction with the driving motor. The AC motor will be protected from being energized against phase failure and for phase reversal.

The controller shall be enclosed in a suitable CRCA/sheet steel of fine finish wall mount cubicle with front doors for easy accessibility of various equipment's either on top landing or inside the lift shaft as per standard practice.

- b Controller accessories:** An emergency stop switch shall be provided and fitted on the top of the car for use of persons working thereon. During maintenance suitable limit switch shall be provided for automatically stopping at the required floors. Limit switches shall be provided to cut off the main supply to the driving motor and to cut off the DC supply to the brake coil causing immediate application of the brakes in the event of the lift traveling past the top or bottom terminal limit switches. The limit switches shall be of the totally enclosed iron clad, quick make and break type.

**V LEVELLING ACCURACY:** The leveling accuracy shall be  $\pm 5\text{mm}$  for passenger convenience under all loading conditions.

**VI ALARM BELL & EMERGENCY LIGHT:** An alarm bell is to be provided and fitted in an approved position close to the lift on one of the floors complete with push button inside the car and with necessary dry cells. Battery operated emergency lamp shall be fitted in the car. The battery shall be maintenance free type supplied and fitted with a battery charger.

**VII WIRING & EARTHING:** The railway will extent electric power for lift from the nearest switch room or near to the lift either on ground floor or mezzanine floor or platform floor or in machine room duly providing a main switch and earthing. From thereon, contractor has to lead the supply to the Lift as required. All necessary wiring in heavy gauge conduits from the MCB to the driving motor, controller call push buttons, door-locks, limit-switches, alarm bell, halfway junction box and wiring inside the car shall be done by the contractor. The contractor shall also provide necessary traveling cables from the car to the

half way junction box in the shaft. Equipment earthing required for the machine and lift well shall be carried out by the contractor. The main earthing shall be No.4, GI wire or subsidiary earthing by No.14 tinned copper wire. All electrical equipments in the lift shaft including controller shall be provided with two distinct earthing arrangement as per IS standards and connected to the earth bus of standard design and earthed to external earth.

- VIII PAINTING:** All parts shall be painted with one coat of paint before dispatch from contractors works. All steel members shall be provided with anti corrosive paint before dispatch. All safety gear items like rods, linkages, clamps, terminations will be electroplated/galvanized to ensure reliable and safety. During erection if any damage to paintings occur the same will be made good before handing over to Railways.
- IX OVER LOAD DEVICE:** The lifts will be provided with accurate overload devices consisting of strain gauges of latest design to give visible and alarm indication of overload in the car.
- X. AUTOMATIC RESCUE DEVICE:** In the event of power failure or failure of control system when the lift is in operation the rescue device should take over automatically and bring the lift to the nearest landing safely. **The rescue device should be operated on rechargeable maintenance free batteries.**
- XI. DRAWINGS AND MANUALS:** Complete detailed layout drawings showing the structural requirements in the building and loadings and disposition of various equipments including position of the RSJs, trap door and the lifting beam and wiring diagram of the various equipments shall be furnished within a month an acceptance of the tender. The operating manual and maintenance schedule shall also be submitted while handing over the installation to the railway.
- XII. TESTS AND TEST CERTIFICATES:** The contractor shall furnish in triplicate their works, test certificates as early as possible and in any case before the erection work is taken in hand after erection the contractor shall carry out such tests as may be necessary to the satisfaction of the railway and these tests shall include the following for establishing.
- The satisfactory operation of the lift including protective mechanisms, safety devices, brake gear, etc. with temperature rise of the driving motor, not exceeding the guaranteed limits.
  - That the floor setting of the car at the landing is correct at all loads from no load to full load.
  - That the speed of the car is as guaranteed and that the acceleration and retardation are satisfactory and smooth.
  - That the operation of the contractors interlocks and time lags are satisfactory and in correct sequence and the correct functioning of the terminal limit switches.
- All tools, instruments, etc. required for execution of the work, testing etc. shall be provided by the contractor. Tests at site will be generally as specified in IS14665 (Part 3 / Sec. I), 2000.
- XIII. TRAINING OF RAILWAY STAFF:** The contractor shall provide adequate training to the Railway staff as nominated by engineer in charge to enable operation and minor trouble shooting of the lift for reliable service. However the responsibility of maintenance of lifts will rest with the contractor during the guarantee period.

**XIV. GUARANTEE :**

- a) The Contractor shall guarantee satisfactory working of the lift erected by him, for a period of “twelve months” from the date of handing over of the lift to the Railway in normal working condition.
- b) During the guarantee period the contractor shall rectify free of cost all defects which may develop due to faulty design, material failure and bad workman ship inclusive of free replacement of defective parts. The guarantee period will get automatically extended corresponding to the periods during which the equipment is not in use, due to failure on the part of the contractor in fulfilling the above obligations.
- c) On every occasion when the equipment goes out of service, the contractor should respond within 8 hours period from the time of intimation of the failure of equipment by the Railways. The contractor will take efforts to attend the repairs on the equipment expeditiously and ensure the working of lifts in the presence of railways representative. The period of outage of lifts will be counted for the extension of the guarantee period till the equipment completes actual service for a total period of 12 months during the guarantee period.
- d) The parts of equipments requiring repairs or replacements will be handed over to the contractor at site and the parts after repairs or replacements shall be fitted in equipment at site by the contractor. All expenses involved in fulfilling the above guarantee obligations shall be borne by the contractor.
- e) The contractor shall service the lifts thoroughly once in a month as preventive maintenance and attend the breakdown complaints free of charge during the guarantee period of 12 months. All expenses involved in fulfilling the above guarantee obligations shall be borne by the contractor.

**XV. PREVENTIVE MAINTENACE:** The contractor shall service the lifts thoroughly once in a month and attend the breakdown complaints free of charge during the guarantee period of 12 months.

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**Annexure 'A'**

Sl.No.	Details	Requirements
1	Scope	The work is for DSETC of One number electrically operated passenger lift, 13 persons capacity gearless & machine room less at MEMU SHED near Manjittidal Railway Station, Tiruchirappalli
2	Location	MEMU SHED, Tiruchirappalli
3	Governing of specification	The lift, design of traction machine, Car body, over speed governor, door & landing control and all safety gears and controllers will generally confirm to provision of IS: 1860, 3534 and 14665 With latest amendments.
4	Electric power supply available	AC 3 phase 415 Volts +/- 10%, 50 Cycles, 4 wire system.
5	Auxiliary	Single phase AC 230V, 50 cycles
6	Type of lift & Capacity	Passenger type / 13 person's capacity.
7	Number of lifts required	One
8	Layout	One lift each for UP & DOWN in station.
9	Type of drive	Permanent Magnet, Gear less drive with VVVF or such energy efficient system of control, compactness, less maintenance etc.
10	Type of control	Microprocessor simplex selective collective with / without attendant.
11	Car travel	No. of Landings – 4 ( GF+3 Floors) Car travel
12	Indicators for car & landings.	Bright, LED / for direction and position provided inside the cabin and all the entrances with push boxes and stain less steel face plates.
13	Position of drive and main machine	Gearless and Machine room less.
14	Landings and car doors	Stainless steel door, Power operated, appropriate center opening fitted with infra red 2D safety sensor
15	Car opening.	suitable for 13 passengers capacity as required.
16	Car safety gear	Over speed governor – safety gear and auto rescue device
17	Car fittings	Suitable aesthetic energy efficient LED light fitting, fan hand rails and smoked mirror glass
18	Push buttons board inside the car	Car push button board with luminous floor buttons as approved by Engineer in charge, one alarm button, change over key for automatic attendant fan and light control, auto fan off, digital LED indicators for direction and position inside the car
19	Leveling.	+ 5mm Irrespective of load
20	Over load detection and alarm	Over load detection with audio and visual indications
21	Engineering design.	The contractor has to go through the basic layout plan of the civil engineering work to ascertain the actual arrangements at site. The contractor should design the total lift system including guidance & supports and plan the erection work as per site condition. He shall interface and co-ordinate for installation and commissioning of lift with civil work
22	Other features	The device shall include: a) Emergency light – SMF battery operated with charger and alarm bell. b) Call register signal and VF door operator. c) Landing bush

Sl.No.	Details	Requirements
		button with SS cover d) Emergency Auto rescue device. e) Inbuilt automatic voltage stabilization circuit for the protection of control circuit. f) Overweight warning system. h) Intercom i) Fire man switch. j) Fire alarm k) Pit ladder and scaffolding. l) Inbuilt on-line reactor circuit to arrest spicks and to protect control circuit PCBs. m) Gong with LED lantern
23	Licensing	It is scope of contractor to liaison with Govt. agencies to avail license for operation of the lift.
24	Scaffolding arrangements	Necessary scaffolding or any such arrangements required for erection, testing and commissioning of lift shall be under the scope of contractor.
25	Provision of foot operated call button facility.	Provision of touch less system / foot operated call button facility for operation inside lift car and at landing floors and addition to call button in the panel
26	Provision of SMS alert facility.	Provision for sending SMS messages immediately attention and rescue and for identified unusual occurrences shall be available in the controller. Provision of SIM and payment of data charges should be borne by the supplier till lift is under warranty and beyond warranty the firm under taking AMC has to extend this facility. Firm should provide concerned Railway free of cost of monitoring facility.
27	Periodical schedule check	Combine safety inspection by the supplier and consignee or representative of consignee should be done once in every fortnight and record shall be maintained in the warranty period. Inspection should include a) instantaneous response of sensor of lift doors, b) working of overweight indicator and alarm, c) function of the fire alarm system, d) function of emergency light, e) working ARD device, f) working of intercom service and g) SMS alert.
28	Minor builder work	Minor civil and electrical builders work required during erection of lift at site such as cutting of pockets / holes in the ceiling by core cutting method for passing of rope & wires construction of pedestal for mounting motor/other equipment, provision of hook, if any for lifting purpose etc shall be under contractor scope.
29	rites Inspection	The materials will be inspected by RITES at manufacturer's premises or contractor's depot as the case may be as desired by the RITES. The purchaser or his representative shall have the right to be present during all the stage of manufacture and shall be afforded free of charge all reasonable facilities for inspection and testing as well as to examine the stage inspection report of the manufacturer and quality audit program of manufacturer

#### **PARTICULARS OF AVAILABILITY/REQUIREMENTS FOR PASSENGER LIFT**

Note: The features given above are only indicative and not exhaustive. Any advanced/essential/safety/energy efficiency features can be modified/incorporated

**GENERAL SAFETY OF LIFTS IN PUBLIC BUILDINGS**

1. While examining the possible causes of accidents in lifts, it was found that in case the lift car stops away from the floor level, there is a possibility of wide gap between the sill and the lower edge of the toe guard to smaller length of toe guards provided in the lifts. In order to reduce the gap between the landing sill and lower edge of toe guard so as to prevent any accidental fall through the gap, it is recommended that the minimum length of toe guard be 700mm for lifts with speeds of 1.5 mps and 1000mm for lifts with speeds above 1.5 mps.
2. Though para 8.4.3 of IS: 14665 (part 2 / sec 1) / 2000 recommends for provision of either an emergency signal or telephone inside the car but as general experience, it is seen that over a period of time these devices become inoperative due to one reasons or the other. Therefore, in order to have at least one device of communication functioning at all the times, as an alternative arrangement, it is recommended that the provision of both i.e. telephone with minimum two connections one at the operator's room and other at guard room and the emergency signal with rechargeable batteries as source of supply be made in the lift cars.
3. **It is seen generally that though the instruction on DO's and Don'ts, as per provision of relevant IS, are displayed in lift cars but the same are either displayed inconspicuous location or very small in size or in one language only. To make these instructions serve the intended purpose and not a mere compliance of relevant IS clause, it is suggested that these instructions should be displayed at a conspicuous location with larger and understandable script and should be written in Hindi, English and regional language.**
4. The name, purpose and numbering of the push buttons / phone / alarm should be displayed clearly and in the same sequence as indicated in the instructions shown against point (1) above, it is worth while to mention here that due to long and continuous use of buttons, the numbering and indications on the buttons get faded over a period of time. Necessary preventive arrangement may be made to make the same as fade-proof.
5. Apart from the written instructions in the lift cars as suggested against point (1) and (2) above, possibility of providing recorded audio clipping in the passenger cars may be considered. The clippings may run continuously and sequentially in Hindi, English and regional language giving instructions on DO's and Don'ts for safety of the passengers.
6. A load plate along with overload alarm, giving the rated load and permissible maximum no. of passengers should be fitted in each lift car in a conspicuous position.
7. For the purpose of identification, the lift number should be displayed outside the landing door, inside the car and in the machine room. This numbering may be used as reference for the purpose of routine/ preventive maintenance, for operating from machine rooms and reporting of any incidents etc.
8. The provision of fireman's control/ switch for the purpose of using the lift for carrying out fire control exercise as per provisions of relevant IS specifications should be made mandatory.
9. The mock drill exercise for all the lifts should be made mandatory and should form part of Annual Maintenance Contracts. The responsibility of conducting mock-drills on regular pre-decided periodicity should lie with the agency undertaking the AMC, and the same should be duly vetted by the resident's representatives.